CLAIMS

WHAT IS CLAIMED IS:

1. A polyester comprising a macromeric unit, wherein the macromeric unit comprises:

(a) at least two lactone derived units;

(b) an initiating core; and

(c) a coupling unit.

2. The polyester of claim 1, wherein the initiating core is linking the at least two lactone derived units to form a macromerdiol.

3: The polyester of claim 1, wherein the coupling unit is linking a plurality of macromerdiols.

4. The polyester of claim 1, wherein the coupling unit and the initiating core have a carbon chain of a length sufficient to alter hydrophobicity of the polyester and thereby enable the polyester to degrade according to a surface erosion mechanism.

5. The polyester of claim 1, the polyester having the structural formula:

$$[-[A]_m-[B]-[A]_m-[D]-]_x$$

wherein A is a lactone derived unit, B is the initiating core, C is the coupling unit, m is a number of repeats from about 4 to about 60, and x is a number of macromeric units from 1 to about 100.

6. The polyester of claim 5, wherein m is 10 to 40.

7. The polyester of claim 5, wherein A is represented by at least one of the formulas:

$$-[-(R_2)-C(=O)-O-]- \text{ and } -[-O-C(=O)-(R_2)-]-$$

wherein R_2 is at least one of C_1-C_8 alkyl and a substituted C_1-C_8 alkyl having at least one carbon substituted with an aromatic group and/or a heteroatom.

8. The process of claim 5, wherein the at least two lactone derived units constitute about 10% to about 99% of the polyester.

9. The process of claim 8, wherein the at least two lactone derived units constitute 50% to 99% of the polyester.

10. The process of claim 5, wherein the lactone derived unit has a number average molecular weight of about 50 to about 12,000.

11. The process of claim 10, wherein the number average molecular weight is 50 to 6,000.

12. The process of claim 10, wherein the number average molecular weight is 50 to

2,000.

13. The polyester of claim 5, wherein B is represented by the formula:

$$-[R_1]-$$

wherein R_1 is a member selected from the group consisting of a C_2-C_{14} linear alkyl, a substituted C_2-C_{14} alkyl having at least one substituent group, a C_2-C_{14} heteroalkyl, a C_2-C_{14} branched alkyl, an alkyl having at least one unsaturated bond, and a polymer.

14. The polyester of claim 13, wherein R_1 is a member selected from the group consisting of C_6, C_8, C_{10} and C_{12} alkyls, a poly(ether), poly(ethylenglycol), poly(amine), poly(propyleneoxide), a block ABA copolymer of poly(oxyethylene) and poly(oxypropylene).

15. The polyester of claim 5, wherein D is represented by the formula:

$$[-C(=O)-(R_3)-C(=O)-]$$

wherein R_3 is a C_4-C_{10} aliphatic or aromatic group.

16. The polyester of claim 15, wherein R_3 is a member selected from the group consisting of C_4, C_6, C_8, and C_{10} alkyls.

17. The polyester of claim 1, wherein the polyester has a molecular weight from about 20 KDa to about 120 KDa.

18. A polyester comprising a macromeric unit, wherein the macromeric unit comprises:

(a) at least two lactone derived units;

(b) an initiating core, wherein the diol derived unit is linking the at least two lactone derived units to form a macromerdiol; and

(c) a coupling unit, wherein the coupling unit is linking a plurality of macromerdiols and wherein the coupling unit and the diol derived unit have a carbon chain of a length sufficient to alter hydrophobicity of the polyester and thereby enable the polyester to degrade according to a surface erosion mechanism.

19. The polyester of claim 18, wherein at least one of the at least two lactone derived units is a C_1-C_8 alkyl or a substituted C_1-C_8 alkyl, wherein at least one carbon is substituted with an aromatic group and/or a heteroatom.

20. The polyester of claim 18, wherein the initiating core is a member selected from the group consisting of C_6, C_8, C_{10} and C_{12} alkyls, a poly(ether), poly(ethylenglycol), poly(amine), poly(propyleneoxide), a block ABA copolymer of poly(oxyethylene) and poly(oxypropylene).

21. The polyester of claim 18, wherein the coupling unit is derived from C_6-C_{12}

aliphatic or aromatic diacyls.

22. A process of making the polyester of claim 1, the process comprising:

providing a lactone;

providing a diol;

providing a coupling agent;

reacting the lactone with the diol in a presence of a catalyst to form a macromerdiol; and

reacting the macromerdiol with the coupling agent to form the polyester.

23. The process of claim 22, wherein the lactone and the diol are provided at a first molar ratio of from about 5 to about 120.

24. The process of claim 22, wherein the lactone and the diol are provided at a first molar ratio of about 5 to about 60.

25. The process of claim 22, wherein the macrodiol and the coupling agent are provided at a second molar ratio of about 1 to about 20.

26. The process of claim 22, wherein the catalyst is a member selected from the group consisting of tin(II)-2-ethylhexanoate, aluminum isopropoxide, salts and oxides of yttrium and lanthanide.

27. The process of claim 22, wherein the lactone is a member selected from the group consisting of lactones of alpha-hydroxy acids, lactones of beta-hydroxy acids, lactones of omega-hydroxy acids, lactones of gamma-hydroxy acids, lactones of delta-hydroxy acids, lactones of epsilon-hydroxy acids, p-dioxanone, cyclic carbonates, optical isomers thereof, substituents and mixtures thereof.

28. The process of claim 27, wherein the lactone is a member selected from the group consisting of lactide, ε-caprolactone, propiolactone, butyrolactone, valerolactone, p-dioxanone and depsipeptide.

29. The process of claim 22, wherein the diol has the following structural formula:

$$HO\text{-}(R_1)\text{-}OH$$

wherein R_1 is a member selected from the group consisting of a C_2-C_{14} linear alkyl, a substituted C_2-C_{14} alkyl having at least one substituent group, a C_2-C_{14} heteroalkyl, a C_2-C_{14} branched alkyl, an alkyl having at least one unsaturated bond, and a polymer.

30. The polyester of claim 29, wherein R_1 is a member selected from the group consisting of C_6, C_8, C_{10} and C_{12} alkyls, a polyether, polyethylenglycol, polyamine, polypropyleneoxide, block ABA copolymers of poly(oxyethylene) and poly(oxypropylene).

31. The process of claim 22, wherein the coupling agent is an acyl halide.

32. The process of claim 31, wherein the coupling agent is a diacyl chloride derived from adipic acid, suberoic acid, sebacic acid, or dodecanoic acid.

33. A device manufactured from the polyester of claim 1.

34. The device of claim 33, wherein at least a part of the device is adapted to be implanted in a body.

35. The device of claim 33, wherein the at least a part of the device is adapted to deliver a bioactive agent.

36. The device of claim 35, wherein the bioactive gent is a member selected from the group consisting of an antibody, a viral vector, a growth factor, a bioactive polypeptide, a polynucleotide coding for the bioactive polypeptide, a cell regulatory small molecule, a peptide, a protein, an oligonucleotide, a gene therapy agent, a gene transfection vector, a receptor, a cell, a drug, a drug delivering agent, nitric oxide, an antimicrobial agent, an antibiotic, an antimitotic, an antisecretory agent, an anti-cancer chemotherapeutic agent, steroidal and non-steroidal anti-inflammatories, a hormone, an extracellular matrix, a free radical scavenger, an iron chelator, an antioxidant, an imaging agent, and a radiotherapeutic agent.